

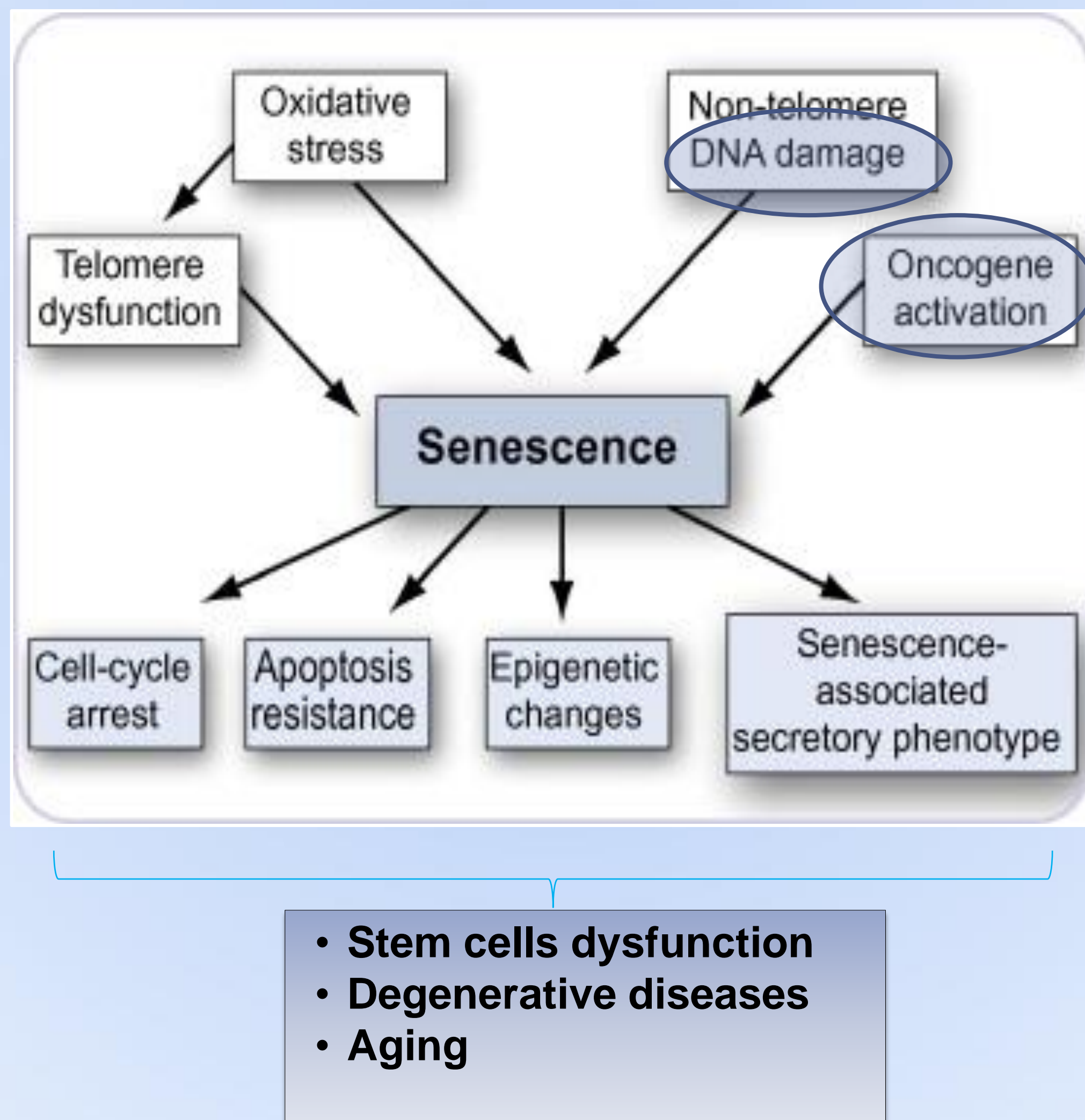
Telomeres, cancer and aging.

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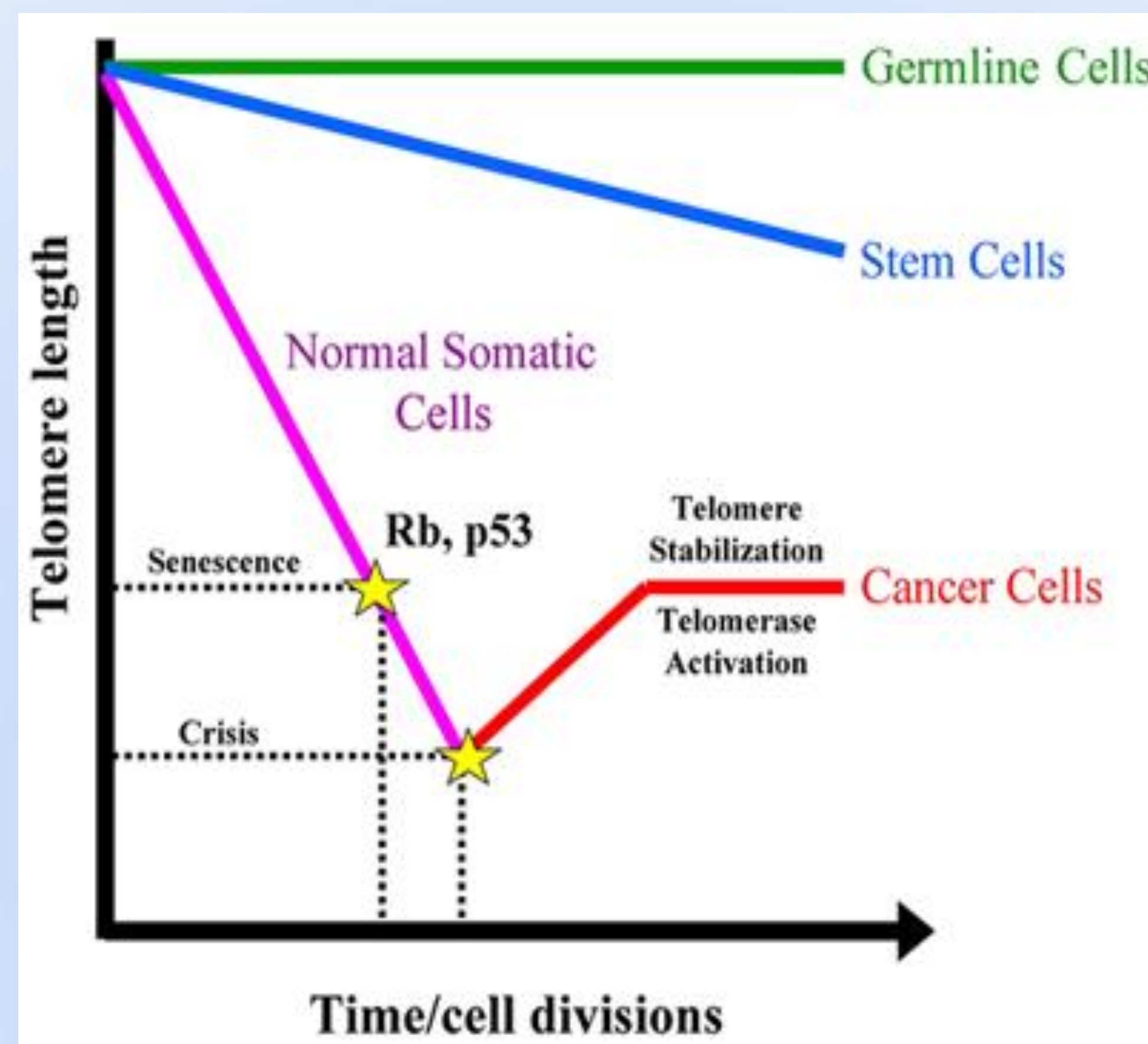
INTRODUCTION: Understanding of telomere function is essential to comprehend the processes which take place aging and cancer, as it's shortening is related to appearance of age-related signs. Besides it has been found that telomerase is present in most cancers, concluding that telomeres are also related to cancer.

1. Senescence protects form cancer but contributes to aging

- Telomeres shortened in every cell cycle, until they become critically shorts.
- Senescence is induced through p53 and Rb expression and they regulating factors p16, p21 and ARF.



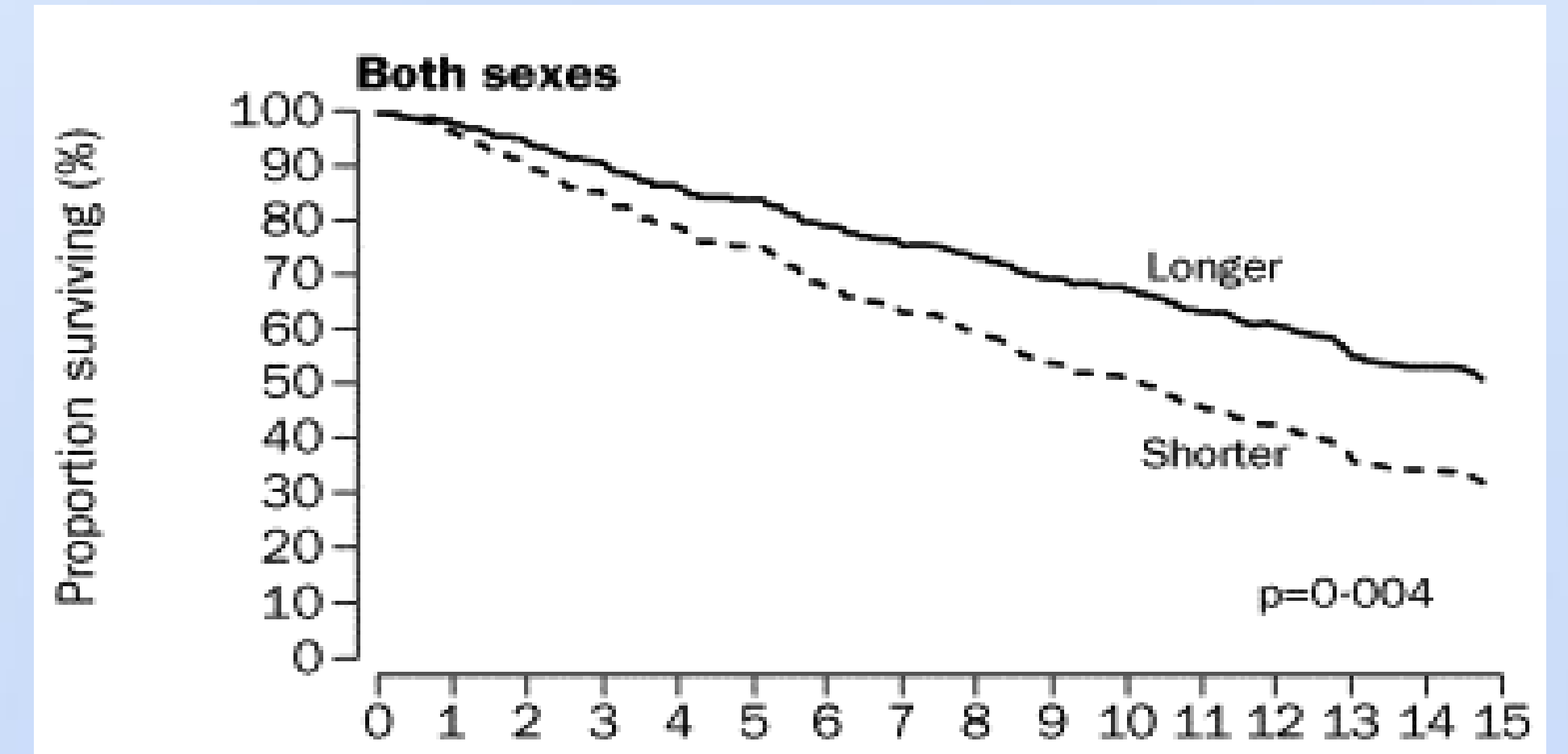
2. Relationship telomeres and cancer



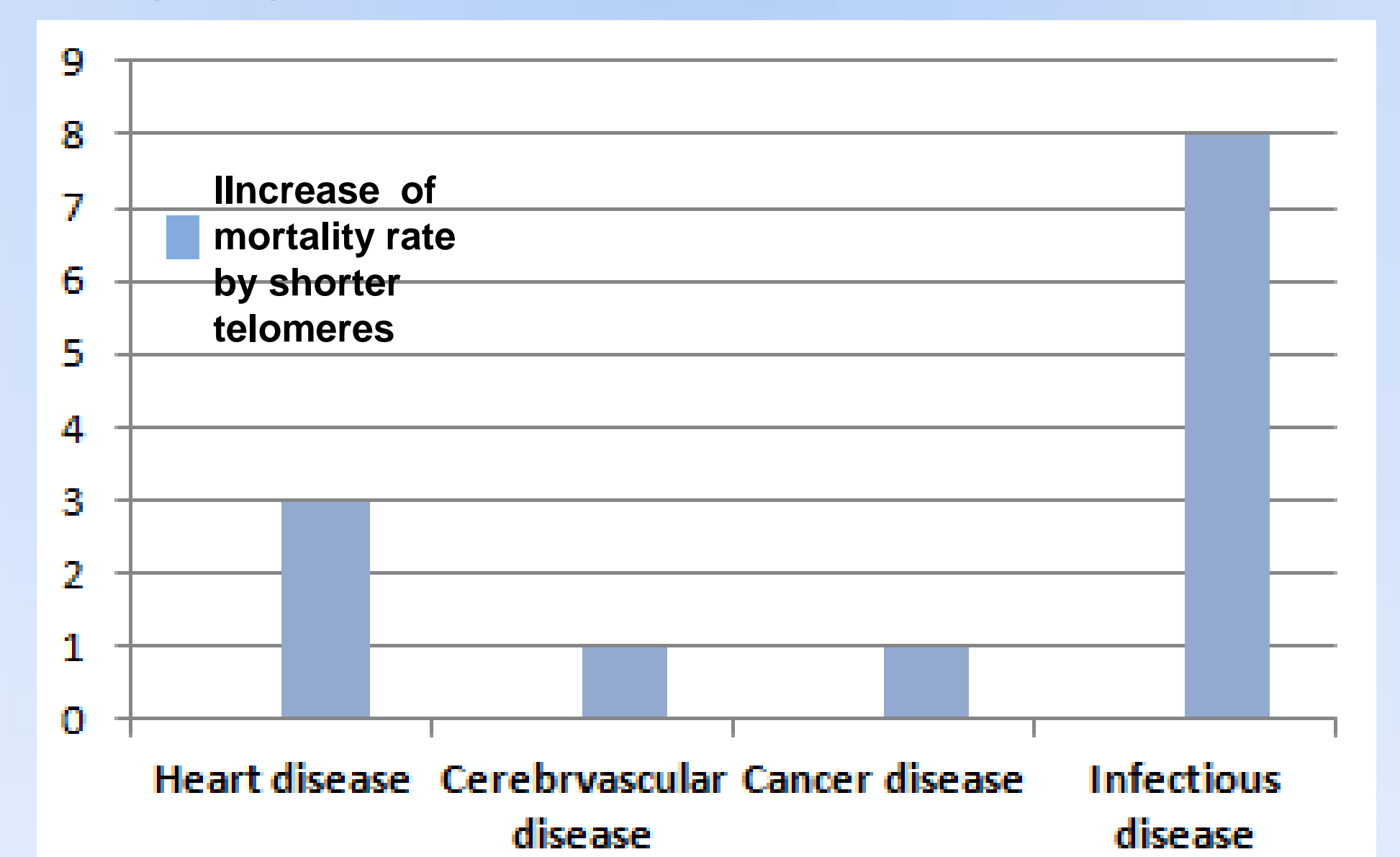
- Cell population that inactivate the Rb and p53 signaling pathways continue to divide until their telomeres become critically shorts, then cells enter in crisis.
- In 10^7 human cells Telomerase is expressed; such cells clones are immortal, but it does not, on its own, cause cell malignant transformation, other mutations are needed.

3. Telomere length indicates the probability of dying

- Population with short telomeres is associates with an excess mortality risk.

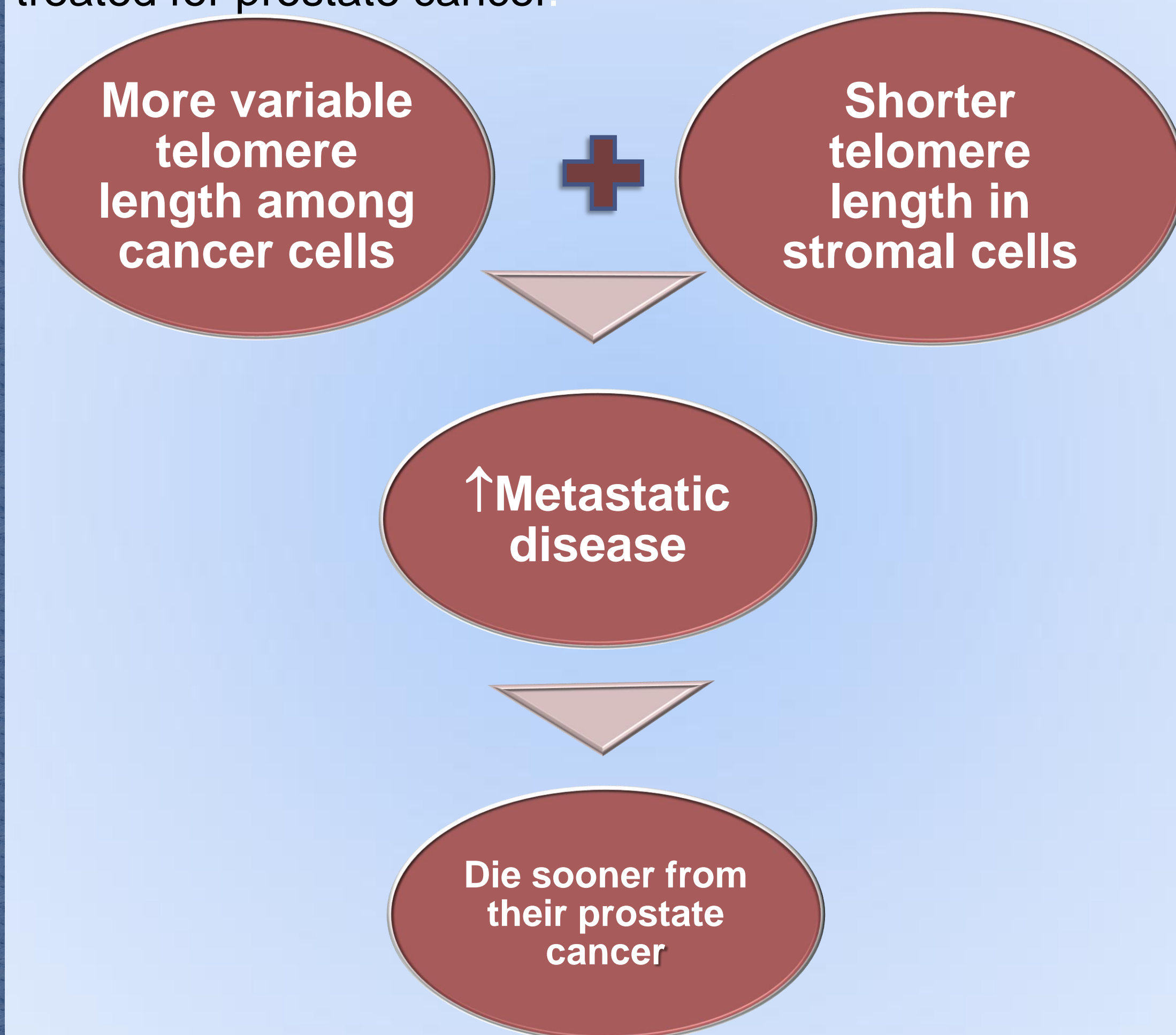


- Telomere shortening contributes to the rise in mortality rates from multiple diseases typically seen with ageing.



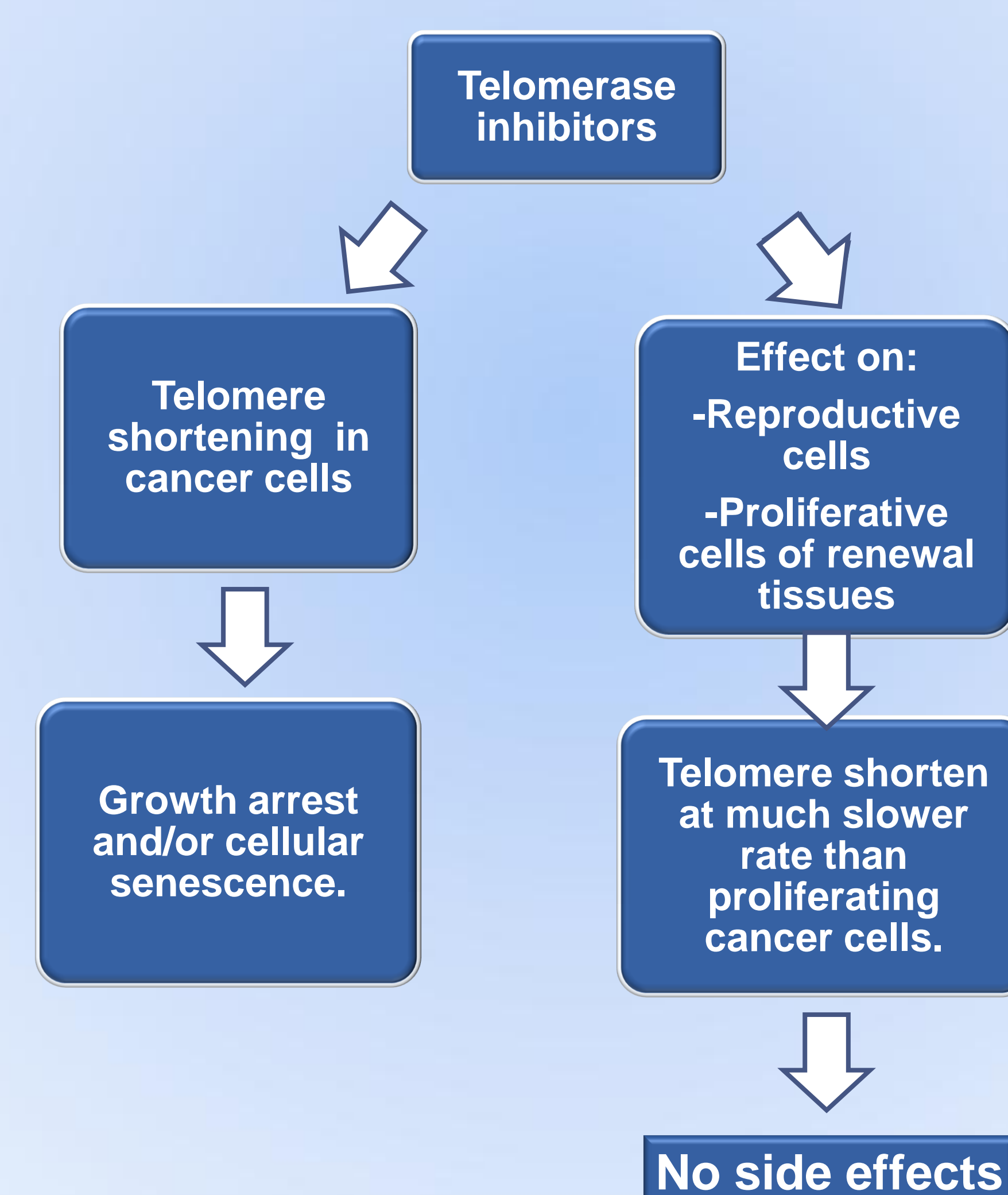
4. Length of telomere may help determine prostate cancer patient's prognosis

The scientists studied tissue samples from men surgically treated for prostate cancer.



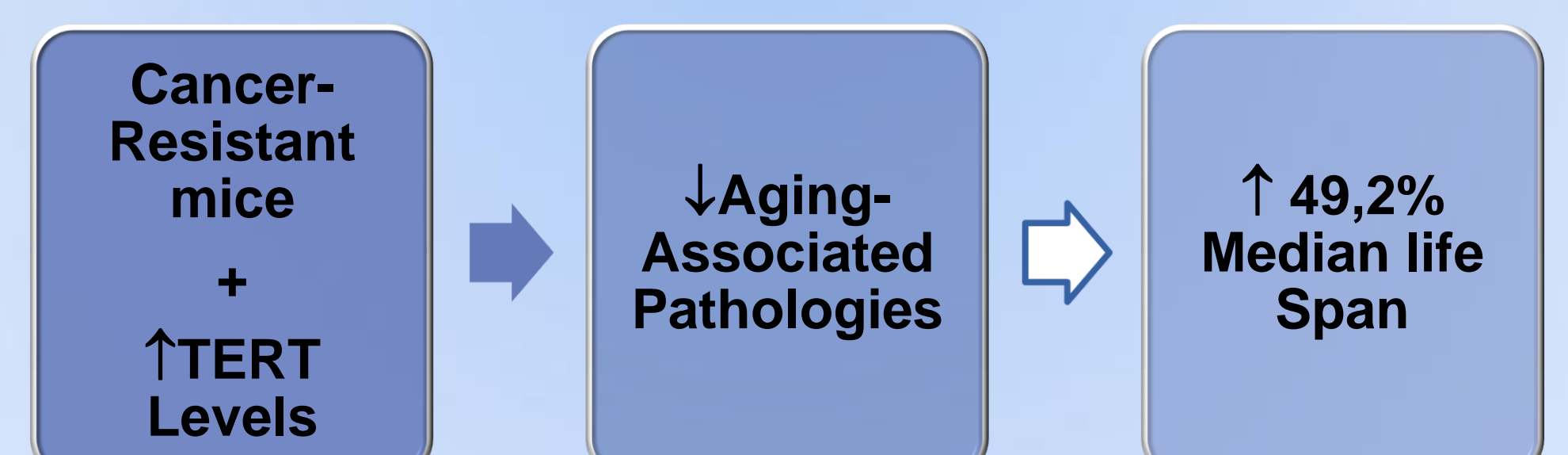
5. Anti-telomerase as a cancer therapy

Since telomerase activity is detected in almost all advanced tumors. The use of telomerase inhibitors may provide an effective approach to cancer therapy.



6. Telomeres, the key to eternal youth

To avoid aging is necessary to lengthen telomeres, for example through the activation of telomerase (TERT), but this leads to the appearance of tumors. If we generate mice carrying a simple transgenic copy of p53 and of the locus encoding Arf and p16, these are tumor suppressors and they suppression activity is sufficient to be called as tumor-resistant mice.



Conclusions: telomere shortening induces senescence, which on the one hand is a limiting factor for cancer proliferation at the beginning although it's not a insurmountable barrier, on the other hand it contributes to aging and secretes factors that promote cancer. Therefore, senescence may be beneficial in a small number, but it's harmful in a large number. The study of telomeres may be useful for treatment, prognosis and detection of cancer, as well as, for delaying the aging.

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